

MAGAZINE SUMMER 2017 ISSUE • FRONTIERS

Seeing Beyond the Blockchain Hype

The potential for blockchain to transform how organizations produce and capture value is very real, but so are the challenges to its broad implementation.

Christian Catalini, interviewed by Paul Michelman • March 27, 2017

READING TIME: 8 MIN

After eluding close inspection by most business leaders outside of the tech and financial sectors, blockchain technology has recently taken center stage in



Hello, visitor. You get to see one **FREE ARTICLE**. To enjoy more

makeover. Indeed, some believe that the long-term business impact of blockchains — which are distributed ledgers that enable and record secure online transactions — may be greater than that of the technologies that have grabbed most of our recent attention, such as data and analytics and the cloud.

However, as with any emerging technology, it can be difficult to separate promise from probability. That is among the reasons why [a new working paper from MIT Sloan School of Management professor Christian Catalini and University of Toronto Rotman School of Management professor Joshua S. Gans](#) is so valuable: It offers a balanced economic analysis of blockchain and cryptocurrencies such as Bitcoin.

Catalini discussed several of the study's key findings and their relevance for managers in a written exchange with *MIT Sloan Management Review* editor in chief Paul Michelman, and what follows is an edited version of their email conversation.

MIT Sloan Management Review: What prompted you to look at blockchain through an economics of innovation lens? What was it that you felt you knew — or suspected — before you began your investigation?

Catalini: There is substantial hype around blockchain and cryptocurrencies. As often happens when a breakthrough technology is on the horizon and uncertainty about its use cases is high, it becomes

tempting to overstate its benefits and ignore the fact that technological change takes time to unfold and often requires entire ecosystems to adapt.

Architectural changes in how value is created and appropriated within a given market do not happen overnight. They will generate resistance from regulators, who are trying to assess the risks the new technology involves, and from incumbents, who are worried about new entrants cannibalizing their revenue models.

In this phase, you often see strong polarization in opinions: On one side, you have detractors who highlight the current limitations of the technology (for example, the fact that bitcoin can process only a small number of transactions per second or that bitcoin mining is highly concentrated in China) and use them to support their view that nothing will change. On the other side, you have the utopians who believe that the technology on its own can solve all the problems of our financial system. The truth, of course, is somewhere in the middle. Economic theory can be extremely helpful in these cases: You take a step back, try to ignore the noise, and focus on the basic assumptions the technology is challenging. This is a difficult exercise, and our paper is just a first attempt in this direction.

We started by asking ourselves: What fundamental costs does blockchain reduce? If you can answer this question, it becomes much easier to identify where

the opportunities are, whether you are an established company, a startup, or a regulator. Applications that do not take advantage of the structural changes in costs that the technology allows for are unlikely to succeed, as they will have a difficult time convincing consumers and businesses to adopt. Similarly, solutions that claim benefits the technology cannot currently deliver are likely to fail.

So, can blockchain reduce costs in a significant way? Where will we see an impact first?

Yes, we concluded that at least two key costs will be affected: the cost of verifying the attributes of a transaction (for example, when did it take place, who was involved, etc.) and the cost of exchanging value within a network without relying on a costly intermediary.

The ability to securely record and time-stamp information on a blockchain is extremely valuable when issues arise with a transaction. Whereas today we often have to invest resources to audit the transaction and assess the truth, in the future, these tasks could be automated thanks to a distributed ledger. This makes settlement and reconciliation across organizations simpler and more efficient, which explains why many early use cases for blockchain are in the financial sector. Here the compelling reason to adopt is the ability to lower operational costs while keeping the rest of the ecosystem the same. It also

explains why banks and financial institutions like distributed ledgers but are worried about cryptocurrencies. Distributed ledgers, on their own, do not challenge existing revenue models and regulatory frameworks. In fact, they may even allow incumbents to achieve greater economies of scale. Cryptocurrencies, in contrast, present an existential threat to how value is generated and appropriated in the economy.

This is where the second cost — the cost of networking — plays a key role: Before cryptocurrencies such as bitcoin existed, we needed intermediaries to transfer value across the globe. Creating and maintaining a secure network was both capital-intensive and labor-intensive. Bitcoin solves this problem by throwing cheap hardware at it: While often criticized for the energy-consuming computations needed to secure it, the bitcoin network has been extremely successful at automating value transfer. Where secure financial messaging platforms such as [SWIFT](#) and [ACH](#) have to invest in maintaining “trusted nodes” to validate transactions, Bitcoin uses a clever mix of cryptography and game theory to deliver the same results. Gone are the accounting, reconciliation, and security costs associated with ensuring that a rogue employee or financial institution did not tamper with the transaction. The integrity of the underlying data is not guaranteed by an intermediary but by the design of the system itself.

This is the architectural innovation associated with cryptocurrencies, and it constitutes both an opportunity and a threat to existing business models.

How does an organization begin to move in the direction of exploiting blockchain technology in the ways you describe here?

In terms of the cost of verification, an organization should ask where resources are currently being wasted in auditing transaction information, reconciling accounting books across different entities, and securing the integrity of digital trails both within as well as outside the boundaries of the organization. By recording transaction attributes on a blockchain, organizations can ensure that auditing them in the future, if a dispute emerges, is cheap.

Of course, the immutability offered by a distributed ledger is helpful only if the information it recorded is accurate in the first place. Hence, the cheaper it is to commit information early in the value chain and in an automated and tamperproof fashion, the better.

Similarly, the more one can envision replacing labor-intensive and time-consuming tasks with a combination of software and a “shared source of truth,” the more the technology is likely to be useful. Early applications on this front range from the trading and settlement of currencies and financial assets to the tracking of ownership stakes in early-stage companies. For example, in [2015 Nasdaq](#)

experimented with executing a private securities transaction for San Francisco-based blockchain startup Chain Inc. on a distributed ledger, removing the manual steps typically involved in the process. Similarly, New York-based Digital Asset Holdings LLC is developing distributed ledger technology for the Australian Securities Exchange post-trade market, and startups such as Boston-based Circle Internet Financial Inc. and Plutus Financial Inc. (d/b/a Abra), based in Mountain View, California, are already using blockchain to lower the cost of transferring money across the globe.

Overall, most existing organizations are likely to benefit from a reduction in verification costs, as this change may not challenge their revenue models and may instead reduce frictions within their existing value chains. The exceptions are organizations that currently profit from securing the transfer of value: For them, blockchain represents a threat to their margins. For example, in the absence of added-value services, key components of payment networks can be commodified using distributed ledgers.

Changes in the cost of networking — although they will take longer to unfold — are more likely to be substantial. The ability to bootstrap a marketplace without the need for a central actor constitutes a radical departure from how most organizations appropriate value within their ecosystem today. Cryptocurrencies enable a hybrid type of organization

that can take advantage of both the efficiency of a market and the more complex forms of contracting and governance that take place within companies or on online platforms. By sourcing capital, talent, and ideas through smart contracts, such organizations will be possibly able to move and allocate resources at a speed previously unimaginable. Many of the online platforms that rely today on their ability to process payments between buyers and sellers, and on controlling a reputation system (such as Uber Technologies Inc. and Airbnb Inc.) may face increased competition from open protocols that source resources and allocate returns in a more flexible way.

Early experiments in this space include startups like San Francisco-based [Numerai LLC](#), a hedge fund that makes investment decisions on the basis of crowdsourced predictions generated by a distributed network of data scientists. The data scientists rely on a cryptocurrency to both disclose their confidence in their models and appropriate the returns from their contributions. In addition, a smart contract ensures that participants do not have an incentive to [“overfit” their data](#), as rewards are linked to the long-run ability of the hedge fund to make good investment decisions.

Who — which people, which functions — within the organization should be leading the investigation of blockchain?

Early on, the ideal team would probably include the

CEO, chief technology officer, chief economist, and some of the key people directly reporting to them. The objective would be to map the idiosyncratic opportunities and challenges cryptocurrencies and blockchain pose for the company and create the right platform for small, cross-functional, entrepreneurial teams to explore novel applications further. In many of these cases, projects will be early stage, high risk, and require collaboration outside the boundaries of the company. Ideally, they would also receive enough autonomy to explore business models that are potentially inconsistent with how the organization currently operates and secures revenues, or at least receive enough funding to make strategic investment decisions in relevant startups.

This article was originally published on March 27, 2017. It has been updated to reflect edits made for its inclusion in our Summer 2017 print edition.

Topics

[Innovation](#)[Innovation Strategy](#)[Leading Change](#)[Technology Implementation](#)

Frontiers

An MIT SMR initiative exploring how technology is reshaping the practice of management.

[See All Articles in This Section](#)

ABOUT THE AUTHOR

Paul Michelman is editor in chief of *MIT Sloan Management Review*. He tweets [@pmichelman](#) on Twitter. Christian Catalini tweets at [@ccatilini](#).

TAGS: [Blockchain](#), [Cryptocurrency](#), [Digital Solutions](#), [Financial Innovation](#), [Technology Innovation](#)

REPRINT #: 58417